

ovoid to round nuclei, immersed in a collagenous stroma. Between those granular cells, islands of odontogenic epithelium were present. In addition, cementum-like bodies and dystrophic calcification were seen, like in previous reports.^{4,5,13,14}

Immunohistochemical staining is a valuable tool in elucidating the possible origin and nature of the granular cells.¹³ In the case reported, the vimentin positivity and S-100 protein and cytokeratin negativity, by the granular cells, confirmed the mesenchymal origin while mitigating against epithelial or Schwann cell origin. Nevertheless, the literature reveals inconsistent findings regarding the expression of S-100 by the granular cells, with some authors reporting slight positivity.^{15–17} Yet, a histiocytic differentiation of the granular cells is proposed by the strong expression of the CD68, previously reported^{4,5,7,12,18} and confirmed in the current case. However, it is suggested that the expression of CD68 by the tumor cells does not necessarily imply histiocytic origin because other studies have shown that CD68 is also expressed by non-macrophage-derived cells.^{19,20} In addition, the epithelial islands had strong positive staining for CK14 and AE1/AE3, as previously reported.^{5,7,18} Moreover, our study agrees with the hypothesis of mesenchymal origin owing to the intense immunoreactivity to CD68 and vimentin and absent immunostaining for CK14 and AE1/AE3 by the granular cells.

The first malignant case related by Piatelli et al⁷ revealed similar immunohistochemical findings to the present case, suggesting that the distinction between a benign and a malignant lesion should be based on the clinical and histopathologic features.

The treatment of GCOT consists of conservative surgical procedures, most often enucleation or curettage. Clinical, radiographic, and the follow-up data led to the conclusion that this lesion has a benign biologic behavior.⁵ However, long-term follow-up is recommended because a malignant counterpart of the CGCOT has already been reported,⁷ and 1 case that was treated with curettage recurred 13 years after it was initially removed.⁵

In conclusion, the immunohistochemical profile of CGCOT in this study and in other publications showed that the granular cells are mesenchymal in origin, with a possible histiocytic cell lineage. Yet, the present case shows a particular feature of large extension with perforation of the maxillary cortical plates, resembling a malignancy, which was excluded according to microscopy findings. However, this feature highlights the possibility of aggressive behavior by these lesions. In this sense, the clinical and imaging features of the lesion, associated to the histopathologic aspects, should be carefully evaluated to perform the correct diagnosis of CGCOT and exclude its various differential diagnoses.

REFERENCES

- Werthemann A. Uber spongiocytaires adamantinoma [in German]. *Oncologia* 1950;3:193–207
- Couch RD, Morris EE, Vellios F. Granular cell ameloblastic fibroma. Report of 2 cases in adults, with observations of its similarity to congenital epulis. *Am J Clin Pathol* 1962;37:398–404
- Vincent SD, Hammond HL, Ellis GL, et al. Central granular cell odontogenic fibroma. *Oral Surg Oral Med Oral Pathol* 1987;63:715–721
- Gomes CC, Naves MD, Pereira MV, et al. Granular cell odontogenic tumour: case report and review of literature. *Oral Oncol* 2006;42:277–280
- Brannon RB, Goode RK, Eversole LR, et al. The central granular cell odontogenic tumor: report of 5 new cases. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2002;94:641–621
- Brannon RB. Central odontogenic fibroma, myxoma (odontogenic myxoma, fibromyxoma), and central odontogenic granular cell tumor. *Oral Maxillofacial Surg Clin North Am* 2004;16:359–374
- Piatelli A, Rubini C, Goteri G, et al. Central granular cell odontogenic tumour: report of the first malignant case and review of the literature. *Oral Oncol* 2003;39:78–82
- Martínez-Mata G, Mosqueda-Taylor A, Carlos-Bregni R, et al. Odontogenic myxoma: clinico-pathological, immunohistochemical and ultrastructural findings of a multicentric series. *Oral Oncol* 2008;44:601–607
- Toro C, Millesi W, Zerman N, et al. A case of aggressive ossifying fibroma with massive involvement of the mandible: differential diagnosis and management options. *Int J Pediatr Otorhinolaryngol Extra* 2006;1:167–172
- Sopta J, Dražić R, Tulić G, et al. Cemento-ossifying fibroma of jaws—correlation of clinical and pathological findings. *Clin Oral Investig* 2011;15:201–207
- Lotay HS, Kalmar J, DeLeeuw K. Central odontogenic fibroma with features of central granular cell odontogenic tumor. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2010;109:63–66
- Calvo N, Alonso D, Prieto M, et al. Central odontogenic fibroma granular cell variant: a case report and review of literature. *J Oral Maxillofac Surg* 2002;60:1192–1194
- Yih WY, Thompson C, Meshul CK, et al. Central odontogenic granular cell tumor of the jaw: report of case and immunohistochemical and electron microscopy study. *J Oral Maxillofac Surg* 1995;53:453–459
- Gesek DJ Jr, Adrian JC, Reid EN. Central granular cell odontogenic tumor: a case report including light microscopy, immunohistochemistry, and literature review. *J Oral Maxillofac Surg* 1995;53:945–949
- Regezi JA, Kerr DA, Courtney RM. Odontogenic tumors: analysis of 706 cases. *J Oral Surg* 1978;36:771–778
- Shiro BC, Jacoway JR, Mirmiran SA, et al. Central odontogenic fibroma, granular cell variant. A case report with S-100 immunohistochemistry and a review of the literature. *Oral Surg Oral Med Oral Pathol* 1989;67:725–730
- Mirchandani R, Sciubba JJ, Mir R. Granular cell lesions of the jaws and oral cavity: a clinicopathologic, immunohistochemical, and ultrastructural study. *J Oral Maxillofac Surg* 1989;47:1248–1255
- de Sousa SO, de Araújo NS, Melhado RM, et al. Central odontogenic granular cell tumor: immunohistochemical study of two cases. *J Oral Maxillofac Surg* 1998;56:787–791
- Facchetti F, Bertalot G, Grigolato PG. KPI (CD68) staining of malignant melanomas. *Histopathology* 1991;19:141–145
- Doussis IA, Gatter KC, Mason DY. CD68 reactivity of nonmacrophage derived tumors in cytological specimens. *J Clin Pathol* 1993;46:334–336

Foreign Body Ingestion During Dental Implant Procedures

Thiago de Santana Santos, DDS, Msc,*

Antonio Azoubel Antunes, DDS,* André Vajgel, DDS, Msc,†

Thames Bruno Barbosa Cavalcanti, DDS,‡

Luiz Ricardo Gomes de Caldas Nogueira, DDS,§

José Rodrigues Laureano Filho, DDS, Msc, PhD†

From the *Oral and Maxillofacial Surgery Program, Faculdade de Odontologia de Ribeirão Preto, Universidade de São Paulo, São Paulo; †Oral and Maxillofacial Surgery Program, ‡Faculdade de Odontologia de Pernambuco, Universidade de Pernambuco; and §Associação Brasileira de Odontologia de Pernambuco, Pernambuco, Brazil.

Received July 21, 2011.

Accepted for publication October 9, 2011.

Address correspondence and reprint requests to Thiago de Santana Santos, DDS, Msc, Faculdade de Odontologia de Pernambuco, Av General Newton Cavalcanti, 1650, 54.753-220, Camaragibe, Pernambuco, Brazil; E-mail: thiago.ctbmf@yahoo.com.br

The authors report no conflicts of interest.

Copyright © 2012 by Mutaz B. Habal, MD

ISSN: 1049-2275

DOI: 10.1097/SCS.0b013e31824cda32

Abstract: Two cases of swallowing of foreign material related to dental implants during dental practice are described. A conservative approach by clinical-radiographic follow-up was performed in both cases; however, one of the patients required colonoscopy under general anesthesia for the removal of the impacted foreign body from the intestinal region. These complications not only have associated economic cost but also carry the risk of malpractice litigation against the professional; thus, the surgeon was responsible for all the costs of hospital and surgery management of this case. Details of the clinical signs, radiographic examinations, type of treatment, and follow-up are presented.

Key Words: Foreign bodies, deglutition, oropharynx, emergencies, liability, legal

The passage of unusual materials through the oropharynx during dental practice is the type of accident that may place the patient's life at risk.¹⁻³ Depending on the path followed, the object can be either swallowed (more common) or aspirated. When swallowed, it can become embedded in any surface during its passage, thereby causing obstructive, inflammatory, or infectious complications.⁴

The diagnosis of foreign body aspiration is generally missed or delayed, and the patient later presents with long-term symptoms and complications, such as cough, stridor, wheezing, obstructive pneumonitis, bronchiectasis, and abscess secondary to recurrent pulmonary infection.⁵

Approximately 80% of cases of swallowed foreign bodies occur in the pediatric population, particularly between the ages of 6 months and 1 year.⁶ This occurrence is infrequent among adults and is seen most often among elderly individuals.⁷ It is mainly seen in patients with psychiatric disorders and intoxicated individuals or secondarily to a specific health treatment.⁸ Cases of attempted suicide by ingestion of dentures, ingestion by patients with mental incompetence, and a dislodged fixed partial denture while undergoing general anesthesia have been reported.^{9,10}

The swallowing of dental objects may accidentally occur for various reasons and frequently involve pieces of prostheses.^{11,12} However, a number of other dental items can trigger this type of injury, especially small objects, such as endodontic files, dental clips, or brackets.¹³⁻¹⁵ The passage of foreign bodies through the oropharynx and other accidents during dental treatment raise a number of questions, initially of a clinical nature: Was the object swallowed or inhaled? Should an attempt be made to remove the object or should the patient be taken to a hospital? Is surgical intervention necessary? Moreover, depending on the course of events, ethical and legal issues may also arise: What is the professional's liability? Who will bear the expenses of the medical treatment? Can the professional be sued by the patient because of the accident?

This article describes 2 clinical cases of foreign body ingestion and addresses what actions should be taken in the case of the disap-

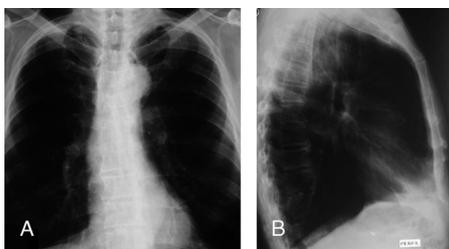


FIGURE 1. Chest radiographs: anteroposterior (A) and lateral (B) views.



FIGURE 2. Abdomen radiograph with radiopaque foreign body in patient's stomach.

pearance of an object from the oral cavity, emphasizing preventive aspects and possible consequences of an ethical and legal nature.

CLINICAL REPORT

Patient 1

A 70-year-old man was referred for prosthetic rehabilitation with dental implants in an edentulous lower jaw. After the placement of 4 implants in the mandible, 3 screws were installed; but during the installation of the final screw, the screwdriver was dropped into the oropharynx. The professional immediately tried to recover the screwdriver, but the patient swallowed it. The patient remained stable, with no signs of discomfort or changes in vital signs. The surgery was completed, and the patient was referred to the emergency department for the analysis of medical specialists. The first procedure was performed to determine the location of the object. Chest radiographs in the anteroposterior (Fig. 1A) and lateral views (Fig. 1B) were obtained, which excluded aspiration. Radiographs of the abdomen revealed the screwdriver in the patient's stomach (Fig. 2). Conservative medical treatment was used, with follow-up involving anteroposterior radiographs of the abdomen and pelvis 1 and 3 days after the incident (Figs. 3A, B) until the foreign body was expelled naturally. The patient was informed to return immediately to the emergency department in the case of any gastrointestinal discomfort for surgical intervention for the removal of the foreign body by endoscopy. After 5 days of monitoring, the patient expelled the foreign body without complications (Fig. 3C), and no clinical abnormalities were observed on subsequent days. The treatment was then completed, with the rehabilitation going as planned.

Patient 2

A 54-year-old man was referred for prosthetic rehabilitation after the installation of dental implants by another professional. During the installation of the prosthetic crowns, the screwdriver fell into the oropharynx and was immediately swallowed. The patient remained

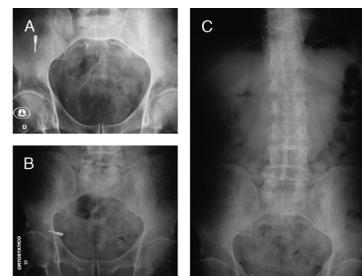


FIGURE 3. Anteroposterior abdomen and pelvis radiographs: 1 (A), 3 (B), and 5 (C) days.



FIGURE 4. Abdomen radiograph with radiopaque foreign body in patient's stomach.

stable, with no signs of discomfort or changes in vital signs. The patient was referred to the emergency department for the analysis of medical specialists. On physical examination, vital signs and auscultation of the lungs were normal. Chest radiographs in the anteroposterior and lateral views were obtained and excluded aspiration. Radiographs of the abdomen revealed the screwdriver in the patient's stomach (Fig. 4). Conservative medical treatment was used, with follow-up involving anteroposterior radiographs of the abdomen and pelvis until the foreign body was expelled naturally. However, the radiographs revealed no differences in the position of the screwdriver between days 7 and 14 after the incident (Figs. 5A, B). The patient did not complain of gastrointestinal discomfort. Immediate intervention by colonoscopy under general anesthesia was used for the removal of the impacted foreign body (Fig. 6). The patient was discharged the next day and has since remained well.

DISCUSSION

The aspiration or ingestion of foreign bodies occurs most commonly in procedures involving fixed prosthodontic dentistry—specifically those involving the cementation of permanent crowns—and adjunctive procedures, such as the placement of cast posts, cores and onlays, as well as in implant-related procedures. The higher occurrence of aspiration and ingestion could be attributed to the absence of rubber dams (barriers) and the ligation of objects with dental wire in the oral cavity during crown cementation and implant procedures. This has obvious implications in occurrences of dislodgement.¹⁶

There is a relatively infrequent occurrence of adverse outcomes from the swallowing of foreign bodies in the special-needs and pediatric populations. This finding contradicts the widely held belief that these patients are at greater risk of aspirating or ingesting dental foreign objects owing to their greater likelihood of having a neuromuscular disease or physical handicap. These conditions can diminish a patient's protective airway reflexes, resulting in difficulty in following verbal commands from the professional.¹⁷

Although both aspiration and ingestion are infrequent occurrences, ingestion occurs more often. This may be a direct result of the strong coughing that occurs when there is a foreign object in the

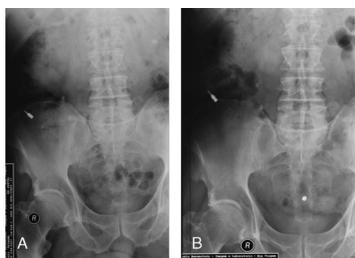


FIGURE 5. Abdomen radiograph showing little displacement: 7 (A) and 14 (B) days.

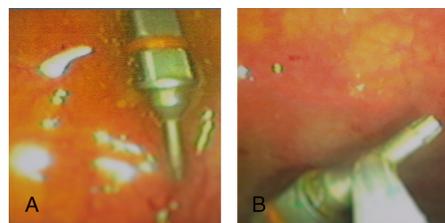


FIGURE 6. Removing the foreign body by endoscopy: screwdriver (A) and capturing the screwdriver (B).

patient's airway, thereby hampering aspiration.^{4,18} Approximately 10% to 20% of patients having ingested a foreign body require a nonoperative intervention, whereas 1% or less require surgery.⁶

The ingestion of a foreign body may not result in any signs or symptoms, and the object may be found totally by chance. However, it becomes apparent when complications arise, such as throat pain or discomfort, persistent sensation of foreign body in the throat, retrosternal pain, tenderness in the neck, total dysphagia, pooling of saliva in the oropharynx, perforation, abscess, or formation of an enterocolic fistula. The patient may also experience sweating and a high temperature and cough up blood.¹⁹ Foreign body ingestion should be considered as a differential diagnosis in patients who present with abdominal and constitutional symptoms and whose laboratory examination results for more common pathologies are negative.²⁰ None of the cases reported here had any signs or symptoms.

When an object falls into the oropharynx, the patient should first be reassured and, if the professional judged it feasible to recover the piece, the use of a pincers or high-power vacuum are suitable for this purpose. The professional must not stimulate swallowing by touching the regions adjacent to the isthmus of the oropharynx, such as the root of the tongue and the uvula.¹⁴ If swallowing occurs, the procedure should be interrupted or brought to a stable situation. The approach taken then depends on the severity of the case and the potential involvement of the upper airways. The patient should be positioned with the head reclined in reverse Trendelenburg position (in which the upper part of the body is raised 20–30 degrees) and usually responds immediately with the cough reflex. The elevation of the chair assists in the attempt to expel the object.²¹ If the object is not expelled, signs of airway obstruction should be promptly identified by monitoring the patient's breathing and consciousness.²²

If the patient has difficulty breathing, he/she should be admitted immediately to an emergency medical service for hospital care. In cases of airway obstruction, basic life support protocols recommend that, if the victim is conscious, is breathing well, and manages to cough effectively, the professional should stimulate coughing and monitor whether the obstruction is resolved. If coughing is ineffective, the Heimlich maneuver should be performed with care not to produce traumatic injury. It is important not to give up if the first attempt fails and repeat the maneuver. As the victim is deprived of oxygen, the muscles of the trachea relax slightly, which may allow the foreign object to be expelled on a second or third attempt.²³

Reported late-onset complications of undiagnosed swallowed dentures include extraluminal migration from the esophagus, causing either a diverticulum or a perforation (once a perforation has occurred, further severe sequelae may be anticipated, eg, tracheoesophageal fistula), enterocolic fistula, sigmoid colon perforation, and death.²⁴ A case is reported in which a removable partial denture was found lodged in the midportion of the esophagus, with its lateral wings deeply embedded in the wall of the esophagus, causing lacerations and severe hemorrhaging.²⁵

Complications such as impaction, perforation, or obstruction most often occur in regions with acute angles or physiological narrowing in the gastrointestinal tract.²⁰ Risk factors that increase

the probability of perforation include the presence of intrinsic bowel disease, such as adhesions, inflammatory bowel disease, tumors, diverticula, hernia, or blind segments.²⁶ Several techniques for the removal of a swallowed foreign body have been reported: endoscopic (colonoscopic or gastroscopic) removal, gastrotomy, laparotomy, rigid esophagoscopy, and cervical esophagotomy.^{7,19,20,27} Colonoscopy has emerged as an important tool in the management of foreign bodies in the colon and allows the retrieval of objects formerly accessible only through surgical intervention. The indications for colonoscopic extraction are obstruction, contained perforation, failure of the object to pass through the ileocecal valve, and the presence of a pointed or elongated foreign body.²⁰ Surgical intervention may be needed because endoscopic removal may not always be successful (patient 2) and can potentially be complicated by massive bleeding and perforation.

Radiologic studies and endoscopic intervention may allow the opportunity to diagnose and remove the foreign body. Ingested dental prostheses made of acrylic resin are often radiolucent and therefore difficult to view using radiologic methods.²⁸ Acrylic dentures are more likely to be discernible using computed tomography because this process is more sensitive to small changes in x-ray attenuation than plain radiography is. Such foreign bodies can also be revealed by magnetic resonance imaging, but access to this equipment in an emergency situation is difficult.²⁹

When adequately aware of the risk of adverse situations that may occur during treatment, the patient shares responsibility with the professional in cases of foreseeable accidents. Thus, it becomes easier to establish in due course who will bear the expenses of the accident (professional, patient, or both). A lack of information provided to the patient or lack of basic behavior to avoid the swallowing or aspiration of objects during treatment may result in judicial proceedings (ethical, civil, or criminal, depending on the case).³⁰ In the civil realm, there is a great possibility that the professional will indemnify the patient for damages and/or expenditures resulting from the accident. Such expenses generally stem from treatments unanticipated by the professional. Professionals with indemnity insurance can make use of such aid. However, the insured professional must be aware of the contents of the policy, in which the values for material and morale damages as well as the requirements for the payment of the premium are stipulated. Therefore, it is essential for professionals to have the complete documentation of the case. Criminal allegations may be related to failure to rescue, personal injury, wrongful death, or other crimes, for which the professional may be penalized with restriction of liberty (detention or imprisonment), ordered to provide services to society and/or pay a fine.^{31–33} All patients in the present article were well informed by the professionals, and no lawsuit was filed. In both cases, the professionals were responsible for all costs for treatment as well as the costs of hospital and surgery management in patient 2.

Adverse events such as the aspiration or ingestion of foreign objects during treatment have considerable health care implications. Although these events occur infrequently, the potential for morbidity associated with a single incident is too high to ignore. This is especially true from the standpoint of the amount of medical care needed to manage these incidents, the high financial cost to the professional, and the potential for malpractice litigation. These incidents are preventable if correct precautions are taken, such as the use of gauze throat screens, rubber dams, and objects connected with dental wire.

REFERENCES

- Santos Tde S, Melo AR, Moraes HH, et al. Impacted foreign bodies in orbital region: review of nine cases. *Arq Bras Oftalmol* 2010;73:438–442
- Santos TD, Avelar RL, Melo AR, et al. Current approach in the management of patients with foreign bodies in the maxillofacial region. *J Oral Maxillofac Surg* 2011;69:2376–2382
- Xiao WL, Zhang DZ, Wang YH. Aspiration of two permanent teeth during maxillofacial injuries. *J Craniofac Surg* 2009;20:558–560
- Lamas Pelayo J, Penarrocha Diago M, Marti Bowen E. Intraoperative complications during oral implantology. *Med Oral Patol Oral Cir Bucal* 2008;13:E239–E243
- Yurdakul AS, Kanbay A, Kurul C, et al. An occult foreign body aspiration with bronchial anomaly mimicking asthma and pneumonia. *Dent Traumatol* 2007;23:368–370
- Webb WA. Management of foreign bodies of the upper gastrointestinal tract. *Gastroenterology* 1988;94:204–216
- Brunello DL, Mandikos MN. A denture swallowed. Case report. *Aust Dent J* 1995;40:349–351
- Vizcarrondo FJ, Brady PG, Nord HJ. Foreign bodies of the upper gastrointestinal tract. *Gastrointest Endosc* 1983;29:208–210
- Price WA, Giannini AJ. Attempted suicide by ingestion of dentures. *J Clin Psychiatry* 1984;45:189
- Lau G, Kulkarni V, Roberts GK, Brock-Utne J. “Where are my teeth?” A case of unnoticed ingestion of a dislodged fixed partial denture. *Anesth Analg* 2009;109:836–838
- Samarasam I, Chandran S, Shukla V, et al. A missing denture’s misadventure! *Dis Esophagus* 2006;19:53–55
- Tiwana KK, Morton T, Tiwana PS. Aspiration and ingestion in dental practice: a 10-year institutional review. *J Am Dent Assoc* 2004;135:1287–1291
- Susini G, Pommel L, Camps J. Accidental ingestion and aspiration of root canal instruments and other dental foreign bodies in a French population. *Int Endod J* 2007;40:585–589
- Milton TM, Hearing SD, Ireland AJ. Ingested foreign bodies associated with orthodontic treatment: report of three cases and review of ingestion/aspiration incident management. *Br Dent J* 2001;190:592–596
- Kuo SC, Chen YL. Accidental swallowing of an endodontic file. *Int Endod J* 2008;41:617–622
- Fields RT Jr, Schow SR. Aspiration and ingestion of foreign bodies in oral and maxillofacial surgery: a review of the literature and report of five cases. *J Oral Maxillofac Surg* 1998;56:1091–1098
- Wandera A, Conry JP. Aspiration and ingestion of a foreign body during dental examination by a patient with spastic quadriplegia: case report. *Pediatr Dent* 1993;15:362–363
- Santos Tde S, Melo AR, de Moraes HH, et al. Impacted foreign bodies in the maxillofacial region—diagnosis and treatment. *J Craniofac Surg* 2011;22:1404–1408
- Hashmi S, Walter J, Smith W, Latis S. Swallowed partial dentures. *J R Soc Med* 2004;97:72–75
- Tsai CY, Hsu CC, Chuah SK, et al. Endoscopic removal of a dental prosthesis in the hepatic flexure of the colon. *Chang Gung Med J* 2003;26:843–846
- Zitzmann NU, Elsasser S, Fried R, et al. Foreign body ingestion and aspiration. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1999;88:657–660
- Nakajima M, Sato Y. A method for preventing aspiration or ingestion of fixed restorations. *J Prosthet Dent* 2004;92:303
- Westfal R. Foreign body airway obstruction: when the Heimlich maneuver fails. *Am J Emerg Med* 1997;15:103–105
- Rajesh PB, Goiti JJ. Late onset tracheo-oesophageal fistula following a swallowed dental plate. *Eur J Cardiothorac Surg* 1993;7:661–662
- Ekanem VJ, Obuekwe ON, Unuigbo A. Death from ingestion of removable partial denture: a case report. *Niger Postgrad Med J* 2005;12:65–66
- Hacker JF 3rd, Cattau EL Jr. Management of gastrointestinal foreign bodies. *Am Fam Physician* 1986;34:101–108
- Imam SZ, Ikram M, Fatimi S, Iqbal M. Cervical esophagotomy for an impacted denture: a case report. *Ear Nose Throat J* 2009;88:833–834

28. de Ruiter MH, Van Damme PA, Drenth JP. Serious complications following (removal after) ingestion of a partial denture [in Dutch]. *Ned Tijdschr Tandheelkd* 2008;115:267–270
29. McLaughlin MG, Swayne LC, Caruana V. Computed tomographic detection of a swallowed denture. *Comput Med Imaging Graph* 1989;13:161–163
30. D'Ovidio C, Carnevale A, Pantaleone G. A case of accidental aspiration of a dental cutter into the bronchopulmonary tree: clinical implications and legal considerations. *Minerva Stomatol* 2008;57:535–547
31. Montagna F, Cortesini C, Manca R, et al. Epidemiology of dental professional liability. *Minerva Stomatol* 2011;60:179–193
32. Wells C, Thomas D. Deaths in the dental surgery: individual and organisational criminal liability. *Br Dent J* 2008;204:497–502
33. Killila BA. Dental professional liability issues. *J Indiana Dent Assoc* 1993;72:22–24

Giant Maxillary Mucocele Occurring After Reduction Malarplasty

Hyo-In Kim, MD, Si-Gyun Roh, MD, Nae-Ho Lee, MD, Kyung-Moo Yang, MD

Abstract: Reduction malarplasty for patients with a prominent malar complex is a popular procedure in Asia. However, a range of complications have been reported after reduction malarplasty, such as hematoma, orbital complications, asymmetric face, and non-union. A medially displaced fracture or bony fragment can induce sinusitis and subsequent trauma to bones in combination with chronic inflammatory processes, which can lead to chronic obstruction of mucus-secreting glands. In our case, 46-year-old man presented with a large mucocele in the maxillary sinus after malar reduction approximately 20 years ago.

Key Words: Mucocele, reduction malarplasty, maxillary sinus

In Asia, reduction malarplasty is quite popular for patients with a prominent malar complex. However, complications after reduction malarplasty have rarely been described in the literature. Reduction malarplasty was first introduced by Onizuka et al in 1983 using an intraoral approach.¹ In 1991, Baek et al² described a method based on a coronal approach, which was devised to increase the limited surgical field and reduce complications, such as cheek drooping. Since then, many new methods have been introduced to improve the disadvantages of previous methods. Cheek drooping, orbital defor-

mity, soft tissue descent, facial contour asymmetry, inferior orbital nerve paresthesia, facial nerve injuries, malunion, and maxillary sinusitis have all been described as complications of reduction malarplasty.^{3,4} Here, we describe a rare case of mucocele, which occurred 20 years after reduction malarplasty.

CLINICAL REPORT

A 46-year-old man presented to our clinic with right zygomatic swelling. He had a history of reduction malarplasty via a bicoronal approach approximately 20 years ago. The swelling was painless and had developed over a year. The patient had no known sinus, nasal, or ophthalmologic diseases before or after reduction malarplasty, and his medical history was noncontributory with respect to systemic infections or tumors (Fig. 1).

A computed tomographic (CT) scan showed a 40 × 50 × 43-mm-sized mass in the right maxillary sinus with bone erosion of the anterior and lateral walls of the sinuses (Fig. 2). Magnetic resonance imaging (MRI) showed a homogenous and protein-rich cystic mass, which was signal amplified in both T1- and T2-weighted resonance modes (Figs. 3 and 4).

The right maxillary sinus was exposed using the Weber-Fergusson approach. The anterior and lateral walls of the maxillary sinus were found to have been pushed medially by a large mucocele. A considerable amount of dark brown, thick, mucoid fluid was drained from the mass, and the surrounding capsule was removed. The anterior and lateral walls of the right maxillary sinus were reconstructed with porous polyethylene titanium mesh plate (SynPOR; Synthes, Inc, West Chester, PA). The histologic examination showed an encapsulated cystic structure with walls composed of epithelium.

DISCUSSION

Reduction malarplasty was performed by Onizuka et al through a chipped zygomatic bone complex using a chisel through intraoral incision in 1983 for the first time.¹ Subsequently, in 1991, Baek et al² described the risk of facial nerve damage associated with the method and proposed a new surgical method that involved reducing the zygomatic bone complex by cutting. Yang and Park⁵ proposed another surgical method of zygoma reduction through preauricular and intraoral incision, the so-called infracture method, to reduce various complications caused by coronal incision. Since then, various methods have been developed for reduction malarplasty. Currently, the infracture technique, which is performed by sectioning the complete malar eminence through the anterior body and posterior arch cutting via an intraoral approach, is most widely used.

Cheek drooping, orbital deformity, soft tissue descent, facial contour asymmetry, inferior orbital nerve paresthesia, facial nerve injuries, malunion, and maxillary sinusitis can all occur as complications of reduction malarplasty.^{3,4} According to Kim et al,⁶ an intraoral approach provides a limited surgical field, which may lead to inaccurate osteotomy and fixation. In the absence of fixation or when fixation is achieved using only 1 wire loop, greenstick fracture of



FIGURE 1. The 46-year-old man who visited the hospital because of right zygomatic swelling.

From the Department of Plastic and Reconstructive Surgery, Medical School, Chonbuk National University, Jeonju, Republic of Korea.
Received August 4, 2011.

Accepted for publication October 9, 2011.

Address correspondence and reprint requests to Si-Gyun Roh, MD, Department of Plastic and Reconstructive Surgery, Chonbuk National University Hospital, 634-18, Keumam-Dong, Dukjin-Gu, Jeonju, Chonbuk, 561-712, Republic of Korea;
E-mail: pssroh@jbnu.ac.kr

The authors report no conflicts of interest.

Copyright © 2012 by Mutaz B. Habal, MD

ISSN: 1049-2275

DOI: 10.1097/SCS.0b013e31824cda4a